

**TAE PLUS: A CONCEPTUAL VIEW OF TAE IN THE SPACE STATION ERA**

Martha Szczur  
NASA/GSFC

**PRECEDING PAGE BLANK NOT FILMED**

## **TAE: Current Profile and Future Direction**

M. Szczur  
NASA/GSFC, Code 521  
Data Systems Technology Division  
Greenbelt, Md 20771  
(301) 286-8609 (FTS) 888-8609

The Transportable Applications Executive (TAE) is a software management system that binds a set of application programs into a single, easily operated system. TAE has packaged a set of common system service functions and user interface functions into a stable framework on which application software can immediately be built. [see Viewgraph 1] TAE was originally developed in the early 1980s to support scientific interactive data analysis applications (e.g., General Meteorology Package (GEMPAK), Atmospheric and Oceanographic Information Processing System (AOIPS), Land Analysis System (LAS), Pilot Climate Data Systems (PCDS)).

In FY86 TAE saw significant growth, in both it's use for new projects and in system development. TAE's user community increased from last year's reported 40 facilities, located at 28 known sites to 110 facilities, located at 65 known sites. [see Viewgraphs 2,3,4] As the use of TAE has grown, the types of applications being built with it has also increased, and now includes scientific analysis systems, image processing, data base management, user assistant/teaching tool, defense systems and prototyping tool.

This last application, using TAE for prototyping user interfaces, has been the prime force behind the new TAE research and development work. The Data Systems Technology Division (Code 500) is developing prototypes of user interfaces for different functions involved in the operation, analysis and data communication of Space Station payloads. [see Viewgraph 5] TAE is a valuable prototyping tool because it enables a developer to build an entire application user interface model and run it without writing a single line of application code. Users/designers can then directly interact with the "proto" system and can quickly change or configure the system by editing the text files. However, while TAE can be used for prototyping today, there are many enhancements and expansions that

are required when a new user type is introduced -- the user interface designer, who will apply human factor techniques in the development of the applications' interfaces. [see Viewgraph 6]

Another force driving new development is the need to update TAE's user interface to support the latest interactive graphic device technology. The current TAE, "TAE\_Classic", uses interface techniques designed for an 80x24 character monochrome alphanumeric terminal, and does not effectively utilize features such as windowing, graphics, color, and selection devices available on newer workstations. To meet our needs, development of a "TAE\_Plus" began in FY86 and involves augmenting TAE with three different sets of tools:

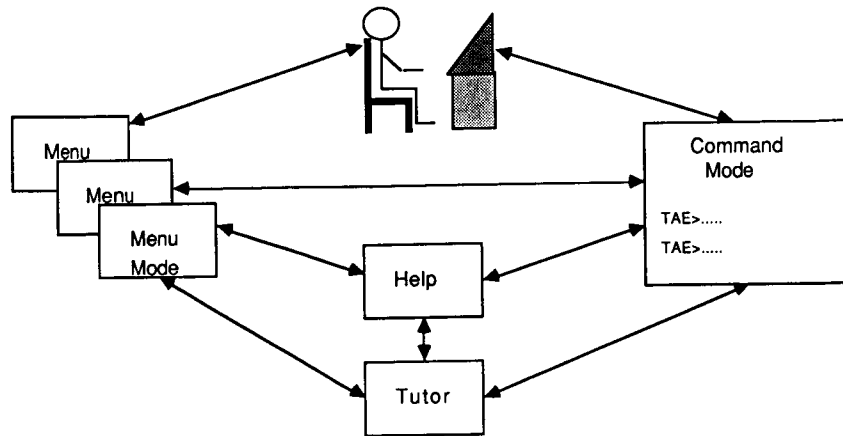
- a user interface toolkit for creating generic interface elements,
- an application toolkit for customizing the generic interface elements for use in a particular application, and
- run-time service subroutines that will tie the application code to the independently defined interface elements.

The change in structure from "TAE\_Classic" to "TAE\_Plus" is shown in Viewgraphs 7 and 8.

We are using a phased approach to develop TAE\_Plus. [see Viewgraphs 9 and 10] In the first phase, we have met the needs of our existing community and provided some support for rapid prototyping by developing a TAE "facelift", which adds an enhanced TAE interface (with windowing, mouse interaction, pull-down menus, etc.) to a select set of graphic workstations (SUN 3, VAXStation II/GPX, and Macintosh with MacWorkstation). [see Viewgraphs 11-14] The TAE Facelift allows us to test many new concepts quickly for feedback and performance. In our second phase we will build a fully-integrated user interface management system, TAE\_Plus, that supports the separation of interface from application, with the concomitant ability to prototype and rapidly change interfaces. [see Viewgraphs 15,16,17] This robust functionality will support, in an integrated manner, an application's development cycle from the prototype step through to the fully operational system.



## SUMMARY OF TAE CLASSIC FEATURES



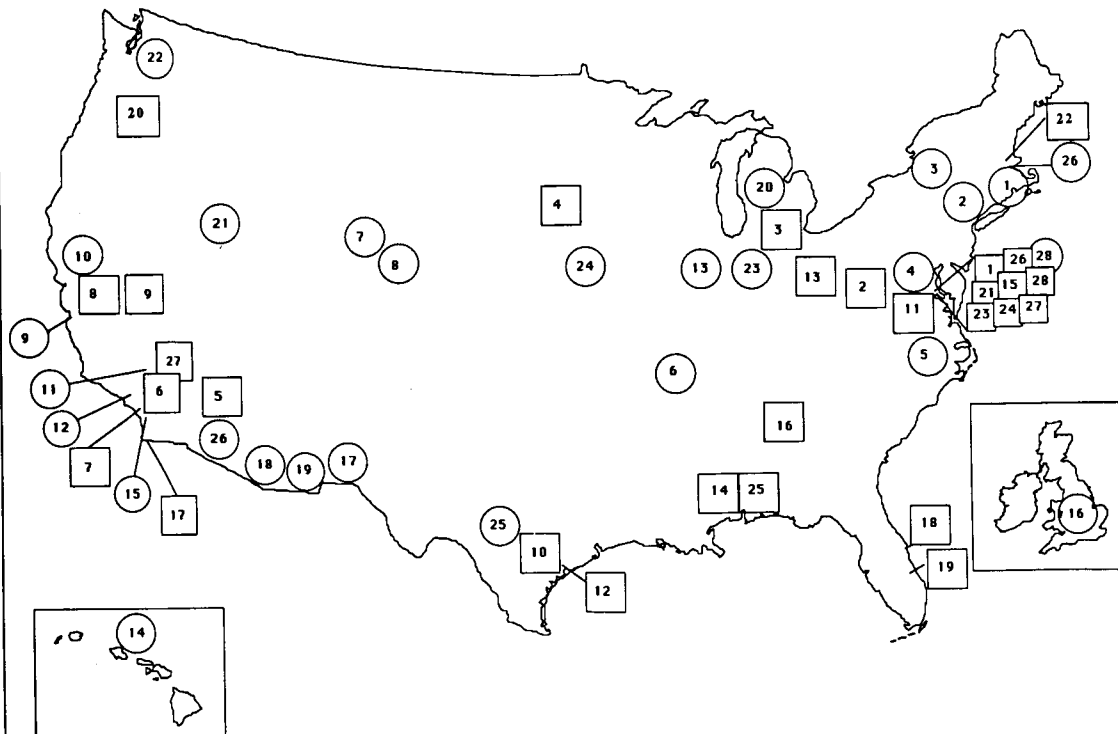
- UTILITY PROCS
- MESSAGES
- LOGON/LOGOFF PROCS
- SESSION LOG

- PROC & MENU HIER-ARCHY SEARCH
- GLOBAL VARIABLES
- SAVED PARAMETER SETS

- ASYNC, BATCH, SYNC
- USER COMMANDS
- PROCEDURES
- FLEXIBLE PARAMETER SPECS



## TAE USER'S SITES -- 1986



## ○ UNIVERSITIES

- ① BROWN UNIV.
- ② YALE UNIV.
- ③ CORNELL UNIV.
- ④ UNIV. OF MARYLAND
- ⑤ N.C. STATE UNIV.
- ⑥ WASHINGTON UNIV.
- ⑦ COLORADO STATE UNIV.
- ⑧ UNIV. OF COLORADO
- ⑨ NAVAL POST GRAD SCHOOL
- ⑩ UNIV. OF CA. BERKELEY
- ⑪ UNIV. OF CA. SANTA BARBARA
- ⑫ UNIV. OF CA. L.A.
- ⑬ UNIV. OF ILLINOIS
- ⑭ UNIV. OF HAWAII
- ⑮ SCRIPPS INSTITUTE/UCSB
- ⑯ IMPERIAL COLLEGE LONDON
- ⑰ UNIV. OF NEW MEXICO
- ⑱ ARIZONA STATE UNIV. (TUSCON)
- ⑲ ARIZONA STATE UNIV. (TEMPE)
- ⑳ UNIV. OF MICHIGAN
- ㉑ UNIV. OF UTAH (2)
- ㉒ UNIV. OF WASHINGTON (2)
- ㉓ PURDUE UNIV.
- ㉔ UNIV. OF NEBRASKA
- ㉕ TEXAS A&M
- ㉖ MIT
- ㉗ CALTECH
- ㉘ NAVAL ACADEMY

## □ GOVERNMENT/RESEARCH LABS

- 1 GSFC (AOIPS/2, LAS, PCDS, PLDS, SEAPAK, DCF,SSTE, OTHERS) (18)
- 2 E-SYSTEMS
- 3 ERIM
- 4 EROS DATA CENTER (3)
- 5 USGS/FLAGSTAFF, ARIZONA
- 6 JPL (MIPL, NODS, PLDS, PDS, ASAS, OTHERS?)
- 7 GLOBAL IMAGING.
- 8 AMES (ARMY, 2GCHAS, NASA/PLDS)
- 9 NORTHROP CORP (USAF)
- 10 SOHIO PETROLEUM CO.
- 11 LANGLEY RESEARCH CENTER/NASA
- 12 JOHNSON SPACE CENTER/NASA
- 13 WRIGHT-PATTERSON AIR FORCE BASE
- 14 NORDA/NSL
- 15 SMITHSONIAN
- 16 MARSHALL SPACE FLIGHT CENTER/NASA
- 17 TETRATECH
- 18 KENNEDY SPACE FLIGHT CENTER/NASA
- 19 HARRIS CORP.
- 20 ANALYTICAL METHODS
- 21 DIA
- 22 DRAPER LAB (USAF)
- 23 CENTURY COMPUTING.
- 24 NAVAL RESEARCH LAB
- 25 NAVAL OCEANOGRAPHIC FACILITY
- 26 NATIONAL BUREAU OF STANDARDS
- 27 EOSAT
- 28 SASC



## CURRENT TAE INSTALLATIONS

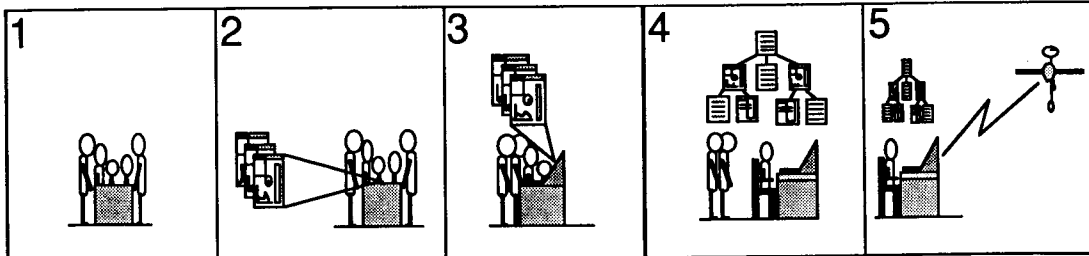
- VAX/VMS
- VAX/UNIX
- SUN/UNIX
- GOULD/UNIX
- APOLLO/UNIX
- HP9000/UNIX
- JUPITER/UNIX

## CURRENT TAE PORTING ACTIVITIES

- IBM/PC/XT
- ISI
- CDC 180/840
- PRIME
- IBM mainframe
- CRAY



## PROTOTYPING STEPS



- STEP 1 Initial Talk Session
- STEP 2 Paper Prototype/ Talk-thru Session
- STEP 3 Rapid Prototype/ Step-thru Session
- STEP 4 Operational User Interface
- STEP 5 Operational Application System

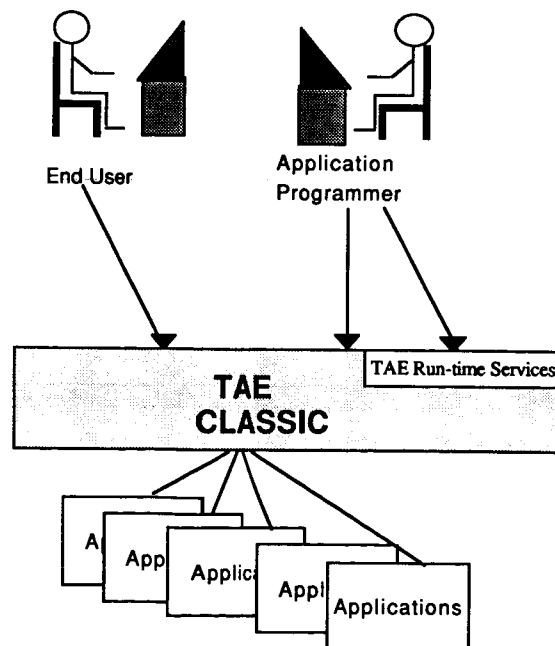


## REQUIREMENTS FOR INTEGRATED PROTOTYPING SYSTEM

- take advantage of new hardware technologies
- support prototyping of user interfaces
- separate the user interface from the application
- manage the defined user interface
- unify and manage the application programs
- supply programmer services and tools to easily access all the system's elements

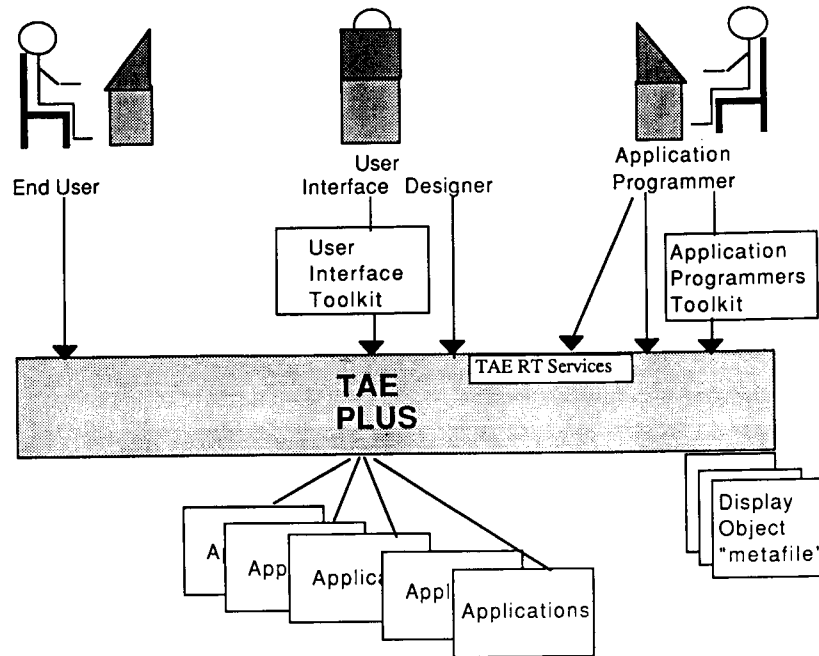


## STRUCTURE IN TAE\_CLASSIC - BASED SYSTEM





## STRUCTURE IN TAE\_PLUS - BASED SYSTEM



## TAE ACTIVITIES AND PLANS

- TAE Facelift
  - SUN3
  - VAXStation II/GPX
  - Macintosh (Macstation/VAX)
- Application Programmer Services
  - MDF/PDF Templates
  - Interface Utility Subroutine Package
  - On-line help for programmers
- Interactive Programmer Toolkit
  - Menu, Tutor, Help Creator/Editor
  - Application Screen Designer





## TAE ACTIVITIES AND PLANS

- Interactive User Interface Designer Toolkit
- New Architecture Definition
  - UIMS Model
- RCJM Enhancements
  - TCPIP Protocol
  - Telescience Prototyping



## ORIGINAL TAE MENU SCREEN

MENU "TARGET", library "sys\$user2:[taep.sotwm]

### Target Acquisition

- |                         |          |
|-------------------------|----------|
| 1) Move to a Region     | (MOVETO) |
| 2) Move within a Region | (MOVEIN) |
| 3) Rotate the slitjaw   | (ROLL)   |

Enter: selection\_number, HELP, BACK, TOP, MENU, COMMAND or LOGOFF





## TAE FACELIFT MENU

### TAE MENU

Menu: "TARGET", library "sys\$user2:[taep.sotwm]

Target Acquisition

(error line)

**Do** **Back** **Top** **Menu...** **Command** **Logoff** **Help**

- 1) Move to a Region (MOVETO)
- 2) Move within a Region (MOVEIN)
- 3) Rotate the slitjaw (ROLL)



## ORIGINAL TAE TUTOR SCREEN

### TUTOR

proc "config", library "sys\$user2:[taep.sotwm]

pg 1+

#### SOT Configuration Setup

<u>parm</u>	<u>description</u>	<u>value</u>
TFILTER	wavelength of spectrograph filter	0
PFILTER	wavelength of spectrograph filter	0
SPECTO	wavelength of spectrograph filter	0
REDUCE	( 1 or .5 )	0.5
EXPOSURE	CCD exposure in seconds	1
OBJECT	object name	"SUN"

Enter: parm=value,HELP,PAGE,QUALIFY,SHOW,RUN,EXIT,SAVE,RESTORE; RETURN to page.



## TAE FACELIFT TUTOR

TAE TUTOR

TUTOR: proc "config", library "sys\$user2:[taep.sotwm]

SOT Configuration Setup

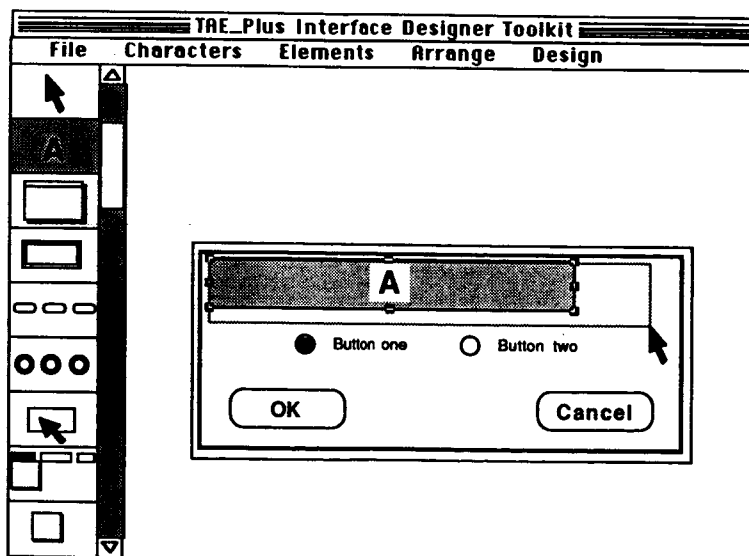
(error line)

**Run** **Show...** **Initial** **Save...** **Restore...** **Structure** **Exit** **Help**

parm	description	value
TFILTER	wavelength of spectrograph filter	0
PFILTER	wavelength of spectrograph filter	0
SPECTO	wavelength of spectrograph filter	0
REDUCE	( 1 or .5 )	0.5
EXPOSURE	CCD exposure in seconds	1
OBJECT	object name	"SUN"

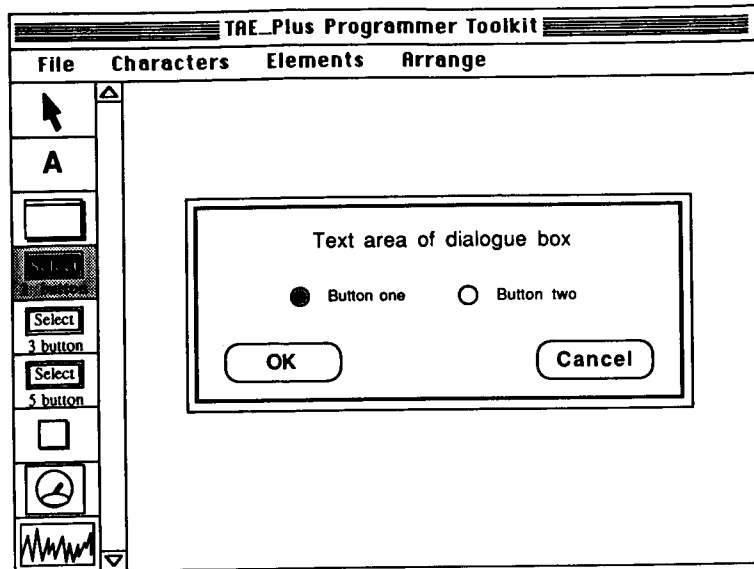


## INTERFACE DESIGNER TOOLKIT SCREEN





## APPLICATION PROGRAMMER'S TOOLKIT



## END-USER'S VIEW OF APPLICATION INTERFACE

